

EPSC Abstracts

Vol. 15, EPSC2021-15, 2021, updated on 28 Nov 2022

<https://doi.org/10.5194/epsc2021-15>

Europlanet Science Congress 2021

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



Solar Orbiter's first Venus Flyby: MAG observations of structures and waves associated with the induced Venusian magnetosphere

Martin Volwerk¹ and the Solar Orbiter Venus 1 MAG Team*

¹Austrian Academy of Sciences, IWF Graz, Graz, Austria (martin.volwerk@oeaw.ac.at)

*A full list of authors appears at the end of the abstract

The induced magnetosphere of Venus is created by the interaction of the solar wind and embedded interplanetary magnetic field with the exosphere and ionosphere of Venus. Solar Orbiter entered Venus's magnetotail far downstream, > 70 Venus radii, of the planet and exited the magnetosphere over the north pole. This offered a unique view of the system over distances that were only flown through once by three other missions before, Mariner 10, Galileo and Bepi-Colombo. The large-scale structure and activity of the induced magnetosphere is studied as well as the high-frequency plasma waves both in the magnetosphere and in a limited region upstream of the planet where interaction with Venus's exosphere is expected. It is shown that Venus's magnetotail is very active during the Solar Orbiter flyby. Structures such as flux ropes, and reconnection sites are encountered as well as a strongly overdapping of the magnetic field downstream of the bow shock and planet. High-frequency plasma waves (up to 6 times the local proton cyclotron frequency) are observed in the magnetotail, which are identified as Doppler-shifted proton cyclotron waves, whereas in the upstream solar wind these waves appear just below the proton cyclotron frequency (as expected) but are very patchy. The bow shock is quasi perpendicular, however, expected mirror mode activity is not found directly behind it; instead there is strong cyclotron wave power. This is most-likely caused by the relatively low plasma-beta behind the bow shock. Much further downstream in the magnetosheath mirror mode of magnetic hole structures are identified. This presentation will take place after the second Venus flyby by Solar Orbiter and BepiColombo and Solar Orbiter on 9 and 10 August, respectively.

Solar Orbiter Venus 1 MAG Team: Tim Horbury, Lloyd Woodham, Stuart Bale, Cyril Simon Wedlund, Daniel Schmid, Robert Allen, Virginia Angelini, Wolfgang Baumjohann, Lars Berger, Niklas Edberg, Vincent Evans, Lina Hadid, George Ho, Yuri Khotyaintsev, Werner Magnes, Milan Maksimovic, Helen O'Brien, Manfred Steller, Javier Rodriguez-Pacheco and Robert Wimmer-Scheingruber